

ON THE USE
OF

By T. LA

It is most difficult to
relieve pain and pro
there is hardly any
of such cases one
rest may not only be
not only relieving
scent, but preventing
most frequently requi
may be only relat
absolute rest are ab
be carefully propo
vanced mitral disea
that absolute rest
patients we see, day
the patient approach
find after death, na
of the veins. Dur
occurs after death,
of the ancients to
air, and that trane
all the blood of t
advanced mitral di
condition. The pu
filled, and the vein
finds a ready exit fr
the veins and lymph
the feet and 25, in
tropic, 25, in
sion of the liver and

Read before the B
Published in The Pro

ON THE USE OF REST AND MASSAGE IN CARDIAC AFFECTIONS.¹

26.

By T. LAUDER BRUNTON, M.D., F.R.S.

It is most cheering to a medical man to find his efforts to relieve pain and preserve life crowned with success, and I think there is hardly any class of cases in which treatment is more satisfactory than in cases of cardiac disease. In the treatment of such cases one of the most important elements is rest, and rest may not only be a remedial measure, but a preventive one—not only relieving severe symptoms when they are already present, but preventing their occurrence. As a remedial measure rest frequently requires to be absolute; as a preventive one it may be only relative. The gradations between slight and absolute rest are almost infinite, and the amount enjoined must be carefully proportioned to each case. It is in cases of advanced mitral disease, where the power of the heart is failing, that absolute rest gives such satisfactory results. In such patients we see, day by day, and hour by hour, the circulation of the patient approaching more and more closely to that which we find after death, namely, emptiness of the arteries and fulness of the veins. During life we never get that condition, which occurs after death, of such absolute emptiness of the arteries as led the ancients to suppose that they contained not blood, but air, and that tremendous fulness of the veins which is due to all the blood of the body being contained in them. But in advanced mitral disease we find a close approximation to this condition. The pulse is small and feeble, the arteries badly filled, and the veins of the body engorged so that the serum finds a ready exit from the capillaries and a slow return through the veins and lymphatics. Thus, we find fluid accumulating in the feet and legs, in the abdomen, and in the lungs, giving rise to dropsical effusions, dyspnœa or orthopnœa, while the distension of the liver and kidneys with venous blood gives rise to an

¹ Read before the Brighton Medico-Chirurgical Society, March 2, 1893.—
Reprinted from *The Practitioner*. Vol. LI, No. 3. 1893.

enormous swelling of the liver and a scanty and albuminous condition of the urine. When patients who seem thus at the point of death are made to take absolute rest, we frequently find the circulation recovering its balance, the arteries becoming filled and the veins emptied, the dropsical effusion and venous engorgement of the organs disappearing, and the patient recovering a fair amount of health.

Before we proceed to consider the use of rest in cardiac disease more in detail, it may perhaps be worth while for me to run over briefly a few points in cardiac physiology, because it is quite possible that we may not regard the functions of the heart from precisely the same point of view; and, when discussing matters of practice, we may not agree because we start from different physiological standpoints. As an example of a case in which such a disagreement is readily possible I may mention the instance of a gentleman who came to consult me several years ago. As he entered my room he seemed to be the picture of health, and I rather wondered why he had come. He said, however, that he was a little bilious and wanted a liver pill. He looked so exceedingly healthy that I was almost on the point of giving him a pill and letting him go without examining the condition of his vital organs; but as this would have been a breach of a rule that I had made for myself, and also in opposition to a habit I had acquired under my old teacher, Dr. Hughes Bennett, of examining every system of the body, I examined his heart, and well it was for me that I did so. For he had, I think, one of the loudest aortic regurgitant murmurs that I had ever heard, and if I had passed it over I think it highly probable that I should have been twitted ever afterwards by his medical attendant, who was an old college friend of my own. My first impulse was to prescribe perfect rest, but he told me that he did not think this would suit him at all, because he went hunting several days a week and never felt well unless he got plenty of exercise. On asking him what he would do if I stopped his hunting, he answered, "There is nothing else I care for, and if you stop my hunting I will sit in the billiard-room and drink whisky and water all day long, and then I will get bilious and ill." Of the two alternatives I thought that the billiard-room with whisky and water was the worst, and so I

advised him to go on hunting, but not to take big jumps or ride a pulling horse. I was encouraged to give him this advice because the regurgitant murmur was so loud. One is frequently tempted to imagine that a loud murmur means much mischief, whereas the reverse is often the case. I am accustomed to show this to students by turning on a tap of water into a basin. In the particular tap that I use, the water flows in a large free stream into the basin with very little noise indeed ; but if I partially close the mouth of the tap with my finger so that a thin jet of water only goes into the basin it makes a loud noise, although only one-tenth part as much water is running out as there was before. In my patient's case I thought that because the murmur was so very loud, the blood was probably passing back from the aorta through a narrow chink in the aortic valves, and that while there was much noise there was practically little regurgitation and therefore comparatively little fear of syncope. Moreover, the walls of the heart were well nourished, and there was sufficient compensatory hypertrophy. Now, suppose I had taken the other course, and advised him to stop hunting, I have no doubt that he would have done as he threatened, and drank whisky and soda-water more or less constantly in his billiard-room. The consequence would have been that his waste products would have been imperfectly eliminated, and he would have not only got fatty accumulation round his heart but almost certainly fatty degeneration of the cardiac muscle. Pure hypertrophy would have given way to dilatation. We should have had the symptoms of mitral regurgitation added to those of aortic regurgitation, and he would probably have been dead long ere now, whereas, after about seven years, I believe he is at present in the enjoyment of very good health.¹

In cases of mitral disease, where the heart dilates, we find that mitral incompetence comes about from the anniculo-

¹ The correctness of this plan of treatment is proved by the result, for since reading the paper I have seen the patient, on July 15, 1893, and he looks the picture of health, and in thorough condition. The aortic regurgitant murmur is as loud as before. The size of the heart is unchanged, the apex being still in the sixth interspace and in the nipple line. He has been hunting and shooting, and has kept in good health while doing so, but got out of sorts for a while when staying with some friends and bad weather prevented him from having open-air exercise.

ventricular orifice becoming too large for the valves.¹ In ordinary cases of primary mitral disease consequent upon

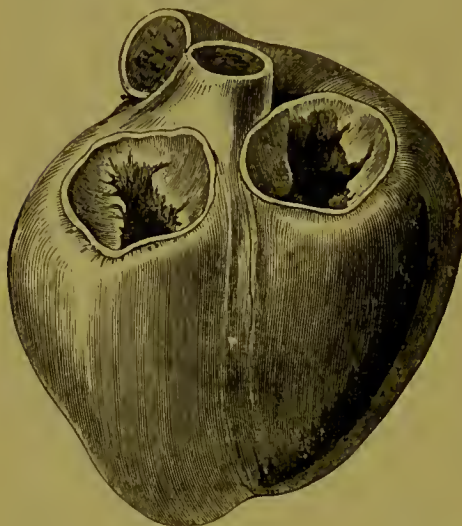


FIG. 1.



FIG. 2.



FIG. 3.

Fig. 1. Heart fully distended, showing insufficiency of the valves to close the mitral and tricuspid orifices.

Fig. 2. Heart in full systole, showing the mitral and tricuspid orifices so diminished by the muscular contraction that the valves close them easily.

Fig. 3. The same heart as in Fig. 2, from another point of view.

rheumatic fever the incompetence comes about from the valves becoming thickened so that they do not completely close, or else puckered so that they become too small for the orifice. To these two causes of mitral incompetence we may add a third, namely, inco-ordinated action of the *musculi papillares*. In my graduation thesis on *Digitalis*,² presented to the University of Edinburgh in 1866, I mentioned that I had several times

¹ See Donald MacAlister, *Brit. Med. Journal*, ii, 1882.

² *On Digitalis, with some Observations on Urine*, 1868.—London: Churchill. p. 30.

observed a blowing systolic murmur in dogs poisoned by digitalis, and I attributed this murmur to an irregular action of the *musculi papillares*. This observation passed almost unnoticed, but Roy and Adami¹ observed almost the same thing, and, by improved methods of observation, have been able to prove the correctness of my supposition. I show you two casts of a heart, one of which is taken with the organ in full contraction and the other in full relaxation (Figs. 1, 2, and 3). You will see that in the fully-contracted heart, the muscular walls have so lessened the opening of the auriculo-ventricular orifices that even very imperfect valves would be able to close it completely. In the fully-dilated heart, on the contrary, the auriculo-ventricular orifice is so large that even perfect valves might be unable to close it completely.

It is hard to say positively that such widening of the auriculo-ventricular orifice is the *sole* cause of the mitral regurgitation which we find, without any obvious disease of the valves themselves, in cases of dilatation of the heart, whether this dilatation be due to overstrain, more especially in the hearts of young and quickly growing people, in chlorosis, in enfeebled hearts after acute disease, in fatty heart pure and simple, or in the hypertrophied heart consequent on aortic disease or chronic renal mischief. In all those cases it is possible that some disturbance of the relationship between the *musculi papillares* and the dilated ventricle tends to aid the regurgitation. However this may be, it is certain that we do find mitral regurgitation coming on in boys who are rapidly growing and present no evidence of acute rheumatism. As an example, I may take the case of a boy at Rugby, who was tall and strong for his years, and was expected to take a leading part in football matches. This he did, but fainted once or twice in school without any apparent cause. He was brought up to me for examination, and I found that he had a somewhat dilated heart with a systolic murmur at the apex. I explained to him that, in all probability, if he would take care of his heart while at school, he would be able for much more athletics when he went to college, and he, being a sensible fellow, did as he was directed. His heart gradually improved and the murmur completely disappeared, but it was apt to

¹ Roy and Adami, *Phil. Trans.*, 1892.

reappear for a short time after vigorous exertion. This is not an isolated case, but is, I believe, a type of a phenomenon by no means unfrequent. A certain amount of mitral regurgitation is, I think, still more common in chlorotic girls. I have been astonished lately, in examining a large number of such cases, to notice how frequently, in addition to an anæmic bruit over the pulmonary artery and a venous hum in the neck, I have been able to hear another distinct systolic murmur at the apex, which was also audible at the angle of the scapula. I remember seeing such a case about fifteen years ago. It was brought to me by a medical man of great ability, and we both came to the conclusion that there was mitral regurgitation, and looked upon the case as one of heart disease. Now, I should class it simply as one of cardiac weakness, and although the treatment might be very much the same, the prognosis would be very different, for I should look upon such a case as likely to get perfectly well when the anæmia disappeared. In some of these cases we meet with the combined effect of anæmia and strain, and I was much interested in one case under my care, which was that of a girl, aged nineteen, who always got a distinct mitral regurgitant murmur after a dance, a murmur which lasted from three days to a week or so, and then disappeared. The curious thing about it was that she was able to play lawn-tennis without any murmur being produced, and so I fancy that in its production the fatigue induced by late hours, close air, and perhaps nervous excitement, had more to do with the enfeeblement of the heart than the strain of actual muscular exercise; although perhaps at a ball the strain was more prolonged, if less violent at the time, than during a game or two of lawn-tennis.

In the treatment of cardiac dilatation occurring either in growing schoolboys or in chlorotic girls, either at school, or, still more frequently, after they have left school, comparative rest may be useful, and sometimes absolute rest may be almost essential. In some cases comparative rest is all that is wanted as a prophylactic measure, and where the boy is growing quickly he should be carefully examined from time to time by a medical man, and care taken that his exertions should be regulated according to the power of his heart and not according to the strength or size of his limbs. While it is strongly advisable

that boys should be kept from dawdling about and from laziness, it is equally necessary that their young hearts should not be overstrained by compulsory runs either along a regular course or over the fields in a paper-chase. In chlorotic girls, gentle exercise is, I think, certainly advisable, but it should be carefully graduated. They should not be allowed to hurry, and it should always be remembered, when they go out for a walk, that they have to come back home. For sometimes this point is forgotten, and they go out walking under the belief held by themselves or their friends that the more exercise they take the better it will be for them. Under this belief they turn back only when they begin to feel tired, and then they drag their weary limbs slowly homewards and arrive completely exhausted. As a sort of rough guide, such girls may be told that as soon as they find themselves giving an involuntary sigh they must turn and go back. In such cases the exhaustion is certain to do harm, although moderate gentle graduated exercise is almost certain to do good. In his book on *Fat and Blood, and how to make them*, Weir Mitchell pointed out very clearly the uses of massage; and in chlorotic cases, where the heart is distinctly dilated and there is consequently imperfect closure of the mitral orifice, massage may be used as a useful adjunct to other treatment, for it gives the patient's limbs exercise without any strain being put upon the heart. I have frequently recommended it and found it very beneficial in addition to other measures, although I have not had occasion to use it along with absolute rest in cardiac dilatation due to chlorosis. In very severe cases, however, I think it might be worth a trial.

In growing boys at school I am inclined to think that endocarditis is more frequent than might be generally supposed, and where this occurs absolute rest is, I believe, essential. For example, in a boy aged fourteen, a feverish attack came on with no apparent reason, and it was put down to drains. He got over this and then got whooping-cough, but while his medical attendant was listening to the chest on account of the cough, a systolic murmur was discovered both at the apex and the base. When I saw him the murmurs were not only distinct but the heart was much dilated. He was kept strictly to bed. The basic murmur disappeared, and the apex

murmur became quite indistinct when he stood up, but became much more distinct when he lay down, and the heart's action was very irregular. This condition lasted more than three months, and then the boy gradually got better. He was allowed to take very gentle exercise at first, it was gradually increased, and now I believe he is perfectly well. In such cases as these, the old proverb "long ill, soon well" holds good, and a too hurried attempt to make the patients resume their ordinary work or pleasure is likely to prolong convalescence or bring back a recurrence of the illness. It is fortunate, I think, that in cases of recovery from acute febrile diseases, the muscles of the limbs and body are enfeebled as well as the muscular structure of the heart. Were it not for this provision we should have many more cases of cardiac debility left behind after acute fevers than we have now. It is a question worth consideration how far the symptoms of weak circulation which last so long after an attack of influenza may be due to the fact that in this disease we frequently have a short and sharp febrile attack, which does not last long enough to impair seriously the muscles of the limbs, but may, and does, weaken the heart. It is astonishing to find how often the tale is repeated, "I had the influenza a year or more ago and I have never been well since," and these patients complain frequently of no very definite symptoms, but of weakness, languor, mental depression, and enfeeblement of their mental powers, their memory being defective and their power of attention being greatly diminished or almost gone. Such symptoms as these are just what one might expect from the feeble circulation, and it is quite possible that if patients were kept longer as invalids, and were obliged to treat themselves as convalescents from a severe illness for a week or two after the disease seemed actually to have passed away, we might hear fewer complaints of its after-effects.

Only this morning I saw a case of this sort, an old college friend of mine, a doctor, aged forty-seven, who came in to consult me. He had had influenza in 1891, and again in March, 1892. The first attack was slight, the second was severe. He was ill in bed for a week with congestion at the base of the right lung and muscular prostration. As he had many cases to attend, he got up as soon as he possibly could, and was out of the house in a week; but after that found that his breath was

short and he could not walk a hundred yards without feeling out of breath. The place where he lived was hilly, and he felt the difference much more when he went up hill; whereas formerly he was able to ascend without difficulty, he could not do so after this attack. His pulse was feeble and about 120 per minute. There was no rise of temperature; his legs shook under him, and he became completely exhausted after ten minutes' exercise instead of after ten hours. In April he went out for a quick march with the volunteers, and did four miles at a considerable pace, when he got great pain over the right side of the heart. During the summer he was fairly well, except that he had tightness across the chest after exercise. In the autumn he went to the Highlands in time for some shooting and fishing, but a morning's work exhausted him, whereas previously he was able to shoot or fish the whole day long. He felt well and ate well, yet there was such weakness of the muscles of the limbs and of the heart that he had to stop fishing and shooting and lie down for half-an-hour to an hour. Then he got œdema of the ankles, which has continued more or less ever since, and his heart is apt to flutter for no apparent reason whatever. On examining him to-day I found that everything was normal except the heart. The absolute cardiac dulness was three inches from the middle of the sternum towards the left; the apex-beat was in the fifth interspace, impulse not easily felt. There was a systolic murmur at the apex and at the scapula, feeble when he was standing up, heard distinctly after slight exertion, and much more audible when he lay down.

This case is, I think, a typical one of feebleness of the heart arising from exertion too soon after influenza. As my friend was fortunately able to do what he liked without regard to time or money, I advised him to go to Meran and try a regular course of graduated exercise according to Oertel's system.

We may now turn to the question of rest in a fatty heart. I well remember being consulted, nineteen or twenty years ago, by a member of the medical profession who is still alive and hale. He was then beginning to suffer from œdema of the ankles. On examining his heart I could only find weak action but no murmur whatever, and my diagnosis was that his heart was somewhat fatty. I advised that he should have gentle exercise but should not lie up altogether, and that he should take a chaly-

beate tonic with the view of increasing the nutrition and aiding the oxidation of fat in the cardiac walls. Another medical friend of mine, who had also seen this gentleman, scoffed greatly at me because I had not recommended our patient to give up all his work and confine himself to one room or even to bed. My reason for not doing this was that I did not think the patient ill enough, and that I regarded gentle exercise as more likely to bring about a healthy condition of the heart than absolute rest. The plan of treatment that I had recommended really was in substance the same as that which has been so fully developed by Oertel, namely, graduated exercise. The same system is, I think, suitable in cases where the heart is beginning to fail from imperfect blood-supply due to atheroma of the aorta. You can readily see that, if the aorta becomes atheromatous close to the valves, the lumen of the coronary arteries may be encroached upon, and moreover the atheromatous structure is not elastic but is rigid and unyielding, and will, therefore, not respond to the call of the heart for increased blood-supply when any extra work is thrown upon it. In regard to this condition I think it is of extreme importance to auscultate very carefully over the aorta in people of middle age, because we may frequently hear a slight murmur indicative of commencing atheroma, before there is any sign whatever of cardiac failure or indeed of any discomfort whatever in the patient. By careful attention to hygienic conditions, and also by the employment from time to time of iodide of potassium in ten-grain doses three times a day, we may do such patients a considerable amount of good, and if we do not prevent we may perhaps retard the progress of the atheromatous process in their vessels. If this process is not looked after it is likely to lead to cardiac enfeeblement, and whenever the left ventricle becomes feeble in comparison to the resistance it has to overcome, and has thus difficulty in emptying itself thoroughly, it is apt, like other hollow muscular organs whose evacuation is opposed, to become the subject of severe pain, pain which in this case we know under the name of *angina pectoris*. I have lately however, discussed this subject at some length¹ and shall not

¹ Lauder Brunton, "On Cardiac Pain and Angina Pectoris," *Practitioner*, vol. xlvii, p. 241; and "Nervous Diseases of the Heart," in *Hare's System of Practical Therapeutics*, vol. ii. Philadelphia: Lea Bros. and Co.

further enter upon it, but shall pass on now to the question of rest in those advanced cases of mitral disease which I mentioned at the outset of my paper.

When the mitral valve becomes very incompetent and allows much reflux of blood at every beat of the ventricle, the left auricles become distended, the pulmonary veins engorged leading to hæmoptysis, difficulty of breathing, and pulmonary cedema. The increased pressure in the pulmonary vessels obstructs the action of the comparatively weak right ventricle, it becomes dilated, and even if the tricuspid valves do not become too small for the enlarged auriculo-ventricular orifice, yet the pressure in the vena cava is increased, the limbs become cedematous and swollen, the liver becomes congested and enlarged, fluid accumulates in the abdomen, and the venous tension in the kidneys both interferes with the secretion of urine and renders it albuminous. The admirable experiments of Stokvis have shown that it is exceedingly difficult to produce albuminuria by interference with the arterial circulation in the kidney, but that increased venous congestion produces albuminuria with great rapidity. I may show by a diagram

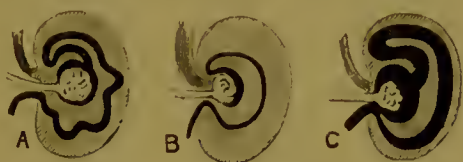


FIG. 4.

Diagram to show the effect of venous congestion and of obstruction of the ureter or tubules on the kidney.

A, normal kidney, with artery in the centre of the hilus. The artery ends in a glomerulus from which a urinary tubule passes into the ureter, which is shown passing out of the hilus below the artery. The renal vein is shown above the artery in the hilus. B shows congestion of the vein, with consequent compression of the artery and tubule. C shows obstruction of the ureter and tubules.

the mechanism whereby the urine becomes so scanty in mitral disease. You will see (B) that not only is the artery leading to the glomerulus unfilled on account of the general low tension in the systemic arteries, but that both it and the tubules are pressed upon by the venous blood which distends the veins, and thus a real mechanical impediment is put in the way of the urinary secretion. When fluid accumulates in the abdomen to such an extent as to cause much tension, still further interference is

exerted on the secretion of urine, for the effect of the pressure is really to a great extent the same as partial ligature of the ureter, obstructing the flow of urine through it. When this is the case we can hardly expect to get the urinary secretion re-established until the pressure of the fluid in the abdomen has been diminished, either by tapping or by free purgation by a hydrogogue cathartic, such as compound jalap powder. But

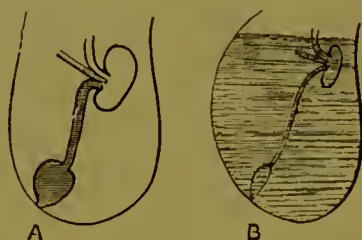


FIG. 5.

Diagrammatic section of the abdomen: A, in the normal state; B, in advanced dropsy, where the ascitic fluid compresses the kidney itself and also the ureter, so that the secretion of urine is hindered in two ways: (1) by pressure on the outside of the kidney, and (2) by pressure on the inside of the kidney from the tension in the urinary tubules.

where the scantiness of the urine depends only on congestion of the kidney, without actual pressure upon the ureter and the abdomen, much may be done to restore its function by simply increasing the power of the heart. We have all seen, again and again, cases of severe mitral regurgitation in which all the symptoms I have just described gradually disappear, the legs becoming natural, the breathing easier, the congestion improved, and the urine copious, under the use of cardiac tonics, such as digitalis, alone or combined with *nux vomica*, even while the patients were walking about. Under the influence of digitalis, *strophanthus*, or other cardiac tonics, the muscular power of the heart becomes increased, the ventricular walls and the *musculi papillares* contract more powerfully, the mitral orifice is narrowed, regurgitation diminished, and thus more blood being sent into the arteries they become better filled, while the distension of the veins and all the symptoms of venous engorgement are correspondingly diminished.

But there comes a time in mitral disease when cardiac tonics, even pushed to their utmost limit, will fail to give relief by themselves, and in spite of them the condition of the patient becomes daily worse and worse. It is in such cases

that absolute rest is of such importance. A connexion of my own was suffering from very severe mitral disease a good many years ago, and every day seemed as if it would be his last. I kept him absolutely at rest in bed, and did not allow him even to feed himself. Under this treatment, along with the use of digitalis, he gradually recovered, and lived for eight years afterwards. And here there is a point in regard to rest to which I would like to draw attention. It is apparently very trivial, and yet I think it is of some importance, namely, the quality of the bed on which the patient lies. A year or two ago I was called to the country to see a patient suffering from severe mitral disease, with swollen legs, enlarged liver, and great breathlessness. He was in bed, but could not rest and preferred to sit up in a chair. I found that he had been sleeping, or trying to sleep, in a feather bed which was too soft and did not give him sufficient support. I made the friends change the bed by taking the hair mattress from under, and putting it over the feather bed, with the most beneficial result, for the patient at once felt rested and was able to stay in bed. But it is very hard to impress upon some patients what you mean by "absolute rest." About three years ago I saw a patient, a man of great activity, great mental power, and untiring energy, who was suffering from severe mitral disease. His medical attendant had treated him in a way that left nothing to be desired, and had insisted upon the necessity for rest; but our patient having known his doctor from a child, and having been accustomed all his life to direct others, was not inclined to fall in with this idea of absolute rest. Although he was unable to lie down and was obliged to sit in his chair or on a couch almost constantly, day and night, for he had severe orthopnea, he insisted on walking across his room and along a passage to the closet. All that I was able to do was to insist that he should give this up, that he should not even get on to a chair, but that he should stay in bed day and night, not even rising from it for any purpose whatever. This just made all the difference, for instead of going steadily downwards he began to go steadily up, and in a little over four months he was able to go out fly-fishing. The diet in such cases is, I think, of much importance, and where the symptoms are so severe as in the case I have just quoted,

patients sometimes do exceedingly well on a pure milk diet, so that the dietetic treatment of such a case is practically almost the same as that of typhoid fever. The advantage of the milk seems to be that it gives them sufficient nutriment without overloading them, that it is less likely to cause flatulent distension and consequent distress than a mixture with farinaceous food would do, and that the lactose it contains appears to have a really decided diuretic action. It is in such cases that massage comes to be so useful. I think there is a good deal of misapprehension regarding massage. Its effect on the body is really very simple, and may be fitly compared to the effect which clearing out the ashes has upon the fire. When the coals begin to smoulder in our fireplaces we stir the ashes out with a poker and then we sweep away the ashes and cinders into the ash-pan, restoring sometimes a few of the cinders to the fire. In massage we have also a twofold action. We stir out the waste products from the muscles and we sweep them into the general circulation, where parts of them are excreted by the kidney and parts of them undergo further combustion. There is a natural provision for removing the muscular waste by a process of muscular action. The fascia which covers the muscle consists of two

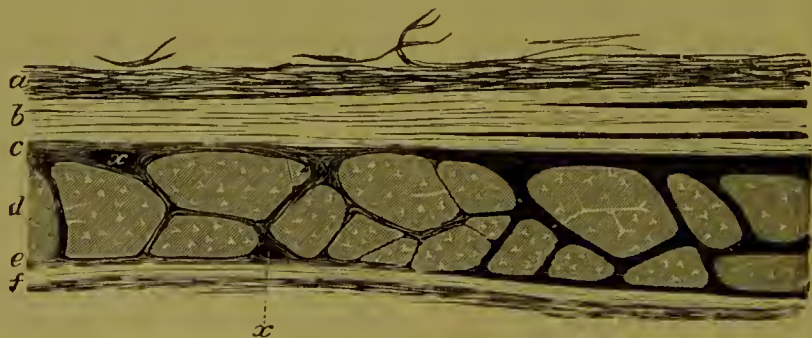


FIG. 6.

Injected lymph spaces from the fascia lata of the dog, after Ludwig and Schwepper-Seidel, *Lymphgefäße der Fascien und Sehnen*. The injected spaces are black in the figure.

layers, and between them is a lymph space communicating with the lymphatics. Each time the muscle contracts it becomes thicker and pushes the inner layer of the fascia against the outer. The lymph, which contains the products of muscular waste, and lies between these layers, is thus driven upwards

into the lymphatics, and its return is prevented by the numerous valves with which these vessels are provided. When the muscle relaxes the two layers tend to be drawn apart, thus causing a sort of vacuum into which the juice containing the products of waste is sucked out of the muscle. Thus it is that muscles in

FIG. 7.

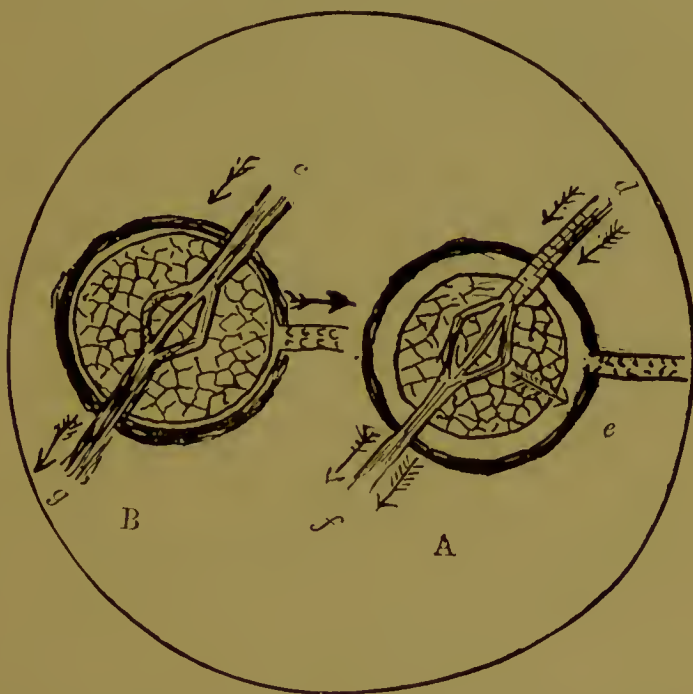


Diagram of transverse section of voluntary muscle to show the pumping action exerted on the muscle, juice and waste products during action. The blood-vessels cross diagonally. To the left (B) the muscle is contracted and presses the two layers of the fascia together so as to drive the muscle juice out into the lymphatics. To the right (A) the muscle is relaxed and tends to draw the layers of fascia apart and suck the juice out of the muscle into the lymph space. *c*, Artery. *d*, Artery. *e*, Lymphatics. *f*, Vein. *g*, Vein. The double arrows in (A) are intended to indicate the increased blood flow through the muscle, and the single arrow within the muscle to indicate the passage of fluid from the muscle into the lymph space between it and the surrounding fascia.

the healthy body will go on acting for hours together without showing the least sign of fatigue. Moreover, the constant removal of the waste tends to bring about a freer supply of blood, with fresh nutriment, just as we almost invariably have to put fresh coal on a fire after we have raked out the ashes. Thus it is that constant exercise of the muscles, instead of making them become smaller, increases their bulk and strength, and the body

generally shares in their well-being—the appetite increases, and the spirits become brighter. But when we put our patients to bed and insist upon absolute rest, as we do in the cases I have just been describing, we put a stop to this natural removal of waste, and we must supply its place by some other means. The appetite declines, nutrition becomes impaired, and so there is a general objection, and by no means an unfounded one, which patients often raise when told to go to bed, for they say—“Oh, Doctor, it is so weakening to go to bed!” Now, the place of exercise is to a great extent supplied by massage. The masseur or masseuse removes the waste products from the muscles and at the same time quickens the flow of blood through them by kneading them so as to squeeze the lymph into the interspaces between the layers of the fascia. He then presses the lymph into the general circulation by slow regular strokes upwards along the course of the lymphatics. In talking of massage I cannot help thinking of Walter Besant’s story of the half-starved young man who sold his appetite to an old epicure. The old epicure ate the big dinner with great enjoyment, and the young man got the feeling of great distension. The old man drank the wine and the young man got the headache. In the case of massage the masseur takes the exercise and the patient gets the benefit.

We all know how fond people are of recommending exercise to their patients or friends, and the great disadvantage in many cases is that the patient is practically too weak to take the exercise. Either his muscles and nerves are too weak or his heart is too weak, and the utility of massage is that the patient gets the advantages of the exercise without overdoing either his muscles, his nervous system, or his heart. In cases of cardiac disease massage allows the treatment to be carried out more easily than it would otherwise be, for it removes the feeling of weariness and irritability, fidgetiness and unrest, which the patients get. It helps to clear away the œdema from the limbs. It helps to empty both the lymphatics and the veins, and by thus driving the blood out of the venous into the arterial system it greatly assists the action of cardiac tonics. To sum up, by the use of massage, combined with absolute rest, milk diet, and cardiac tonics, we often are able to restore patients suffering from cardiac disease who at first sight appear only to have a few days to live.

